# CHAPTER 5

# RESULTS AND DISCUSSION

Aim: To provide and discuss the results of this study according to the formulated aims. The results are presented in tables and figures and are discussed with the view to explore the factors that may influence the premature infants' oral feeding skills and to identify emerging trends and intervention strategies. The results will be interpreted with reference to the literature.

## 5.1 INTRODUCTION

The rising number of premature infants in the NICU's has increased the need for effective, accountable management of these infants. One of the aspects of their management purports the management of oral feeding (Jolley et al., 1995; Rossetti, 1986; Widerstrom et al., 1997). Although research has been done on the oral feeding skills of premature infants and feeding scales exist, the available information seems to be fragmented or inappropriate for premature infants, e.g. feeding scales only assess the tongue and jaw movements (Braun & Palmer, 1985; Palmer et al., 1993, Stratton, 1981) and sucking efficacy was measured in terms of the pressure and flow rate (Brake et al., 1988; Casaer et al., 1982; Daniëls et al., 1986; Jain et al., 1987). The need was identified for a comprehensive assessment tool which would enable the feeding specialist to describe the oral feeding skills of the premature infant in order to identify difficulties and to provide intervention strategies.

**Sub-aim 1** of the study was fulfilled by developing a comprehensive evaluation tool, namely the *"Feeding Evaluation Form for At-Risk Infants" (FEFARI)*, to

enable the clinician to describe the oral feeding skills of the premature infant, which is the **main aim** of this study.

**Sub-aim 2** of the study was realized by applying the FEFARI to subjects. The results obtained from the FEFARI will be discussed according to the subheadings, stated in chapter 4, which are the description of:

- The characteristics of the premature infants used in the study
- The oral feeding skills of these premature infants in terms of:
  - Their non-nutritive sucking skills,
  - Their nutritive sucking skills when feeding from a bottle and a cup
  - The impact the different feeding methods have on their physiological status
- The identification of any pattern of skills at a particular gestational age (developmental trends)
- The identification of suitable intervention strategies for different gestational age groups (clinical application).

## 5.2 PRESENTATION OF RESULTS OBTAINED FROM THE FEFARI

A discussion of the information collected with the FEFARI, according to the subheadings of sub-aim 2, is presented below:

### *5.2.1 DESCRIPTION OF THE CHARACTERISTICS OF SUBJECTS*

The description of subjects follows according to the four subject groups, as well as to the sample as a whole, in terms of their biographical information, medical and feeding history, current state and behaviour and physical status.

### 5.2.1.1 Biographical Information

Biographical information was obtained from the subjects' medical charts and notated on page 1 of the FEFARI (Appendix A).

A summary of the biographical information of the subjects in terms of gestational age, weight, gender and race is presented in Table 5.1:

**Table 5.1. The description of subjects according to each category**

| | | Group 1 N=10 | Group 2 N-11 | Group 3 N=11 | Group 4 N=10 | Total Group | Percentage total group |
|---|---|---|---|---|---|---|---|
| BALLARD SCORE | 28-30 | 0 | 2 | 2 | 1 | 5 | 11.90% |
| | 31-33 | 9 | 5 | 3 | 0 | 17 | 40.50% |
| | 34+ | 1 | 4 | 6 | 9 | 20 | 47.60% |
| | | | | | | | |
| BIRTHWEIGHT | 1-1.49 kg | 5 | 11 | 8 | 5 | 29 | 69.00% |
| | 1.5 –1.8 kg | 5 | 0 | 3 | 5 | 13 | 26.00% |
| | 1.8 kg + | 0 | 0 | 1 | 1 | 2 | 4.80% |
| | Mean | 1.4 kg | 1.22 kg | 1.35 kg | 1.42 kg | | |
| | SGA | 6 | 9 | 8 | 9 | 32 | 76.20% |
| | | | | | | | |
| CURRENT WEIGHT | 1 - 1.5 kg | 6 | 6 | 2 | 3 | 17 | 40.50% |
| (TIME OF EVALUATION) | 1.5 –1.8 kg | 4 | 4 | 6 | 4 | 18 | 42.80% |
| | 1.8 kg + | 0 | 1 | 3 | 3 | 7 | 16.70% |
| | Mean | 1.45 kg | 1.44 kg | 1.65 kg | 1.67 kg | | |
| | | | | | | | |
| GENDER | Male | 5 | 5 | 6 | 3 | 19 | 46.30% |
| | Female | 5 | 5 | 5 | 7 | 22 | 53.70% |
| | | | | | | | |
| RACE | Black | 8 | 9 | 7 | 7 | 31 | 73.80% |
| | Coloured | 0 | 1 | 0 | 1 | 2 | 4.80% |
| | White | 2 | 1 | 4 | 2 | 9 | 21.40% |

The discussion according to the headings used in the table follows below:

#### *.1 Ballard Score*

The Ballard Score awarded to each subject by a paediatrician was used to determine the gestational age of the subjects. Figure 5.1 illustrates the distribution

of the Ballard scores between the subject groups and Figure 5.2 the distribution of the whole subject group.

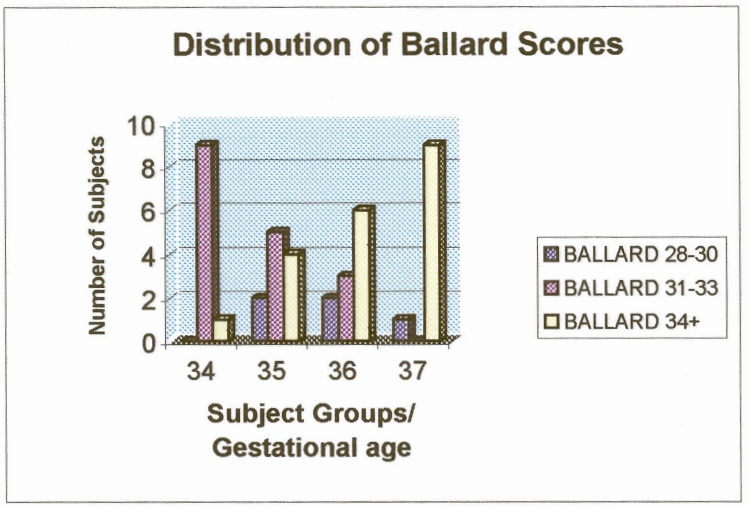


**Figure 5.1 Distribution of Ballard scores of the subject groups.**

In the two younger age groups, Groups 1 & 2 (34 & 35 weeks gestational age), most of the subjects were born at 31-33 weeks gestational age, thus moderately premature (Rossetti, 1996). Group 1 had no extremely premature subjects (born between 24-30 weeks), but Groups 2 and 3 had two extremely premature infants each. In Groups 3 & 4 (36-37 weeks gestational age), most of the infants were born moderately premature (Rossetti, 1996).

Most of Group 4 (37 weeks gestational age) had a Ballard score of 34+. That implies that most of the 37-weeks group and 47.6% of the total group of subjects (Table 5.1; Figure 5.2) were, according to the literature, mature enough to receive oral feedings from birth (Creger, 1995; Merenstein & Gardener, 1989; Sheahan & Brockway, 1994; Vergara, 1993).

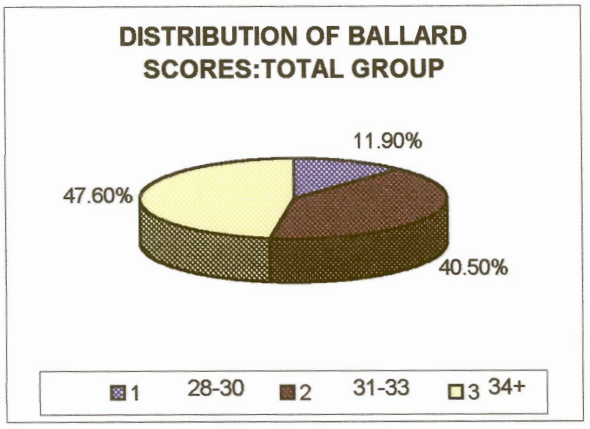


**Figure 5.2 Distribution of gestational ages of the total group of subjects.**

Only 11.9 % of the total group can be considered as extremely premature. These infants are considered to be medically fragile and are associated with poorer developmental outcome than moderate or mil premature infants (Rossetti, 1998)

## . 2 Birthweight

According to Table 5.1, the birth weight of 69% of the total group of infants fell into the 1-1.49 kg span (Very Low Birth Weight/VLBW), with an average of about 1.35 kg. The infants of Groups 1 & 4 (34 and 37 weeks) averaged the highest birth weight (approximately 1.4 kg), followed by 36 weeks (1.35 kg) and 35 weeks (1.22 kg). VLBW infants are considered to have poorer developmental outcome than the LBW infant (Rossetti, 1996). This fact has to be taken into consideration in interpreting the results on feeding skills later on.

According to clinical practices in the Pretoria Academic Hospital's NICU, infants of under 1.8 kg are considered to be unsuitable for oral feeding. A weight criterion is widely used in neonatal units (Brake et al., 1988). Although 47.6% (Figure 5.2) of the total group were mature enough to feed orally at birth, they would probably not have been exposed to any oral feeding experience from birth, as only 4.8% (Figure 5.3) would have met the weight criterion (1 each in the Groups 3 & 4)

(Table 5.1). This is another aspect to consider when interpreting results later on in this chapter.

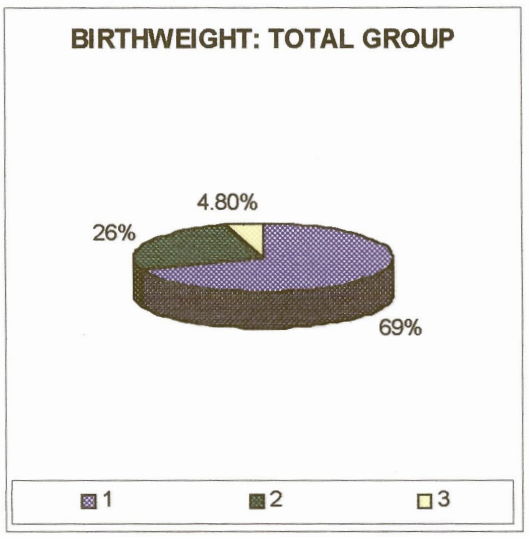


**Figure 5.3 Distribution of birth weight for the total group of subjects**

Some of the subjects can furthermore be categorised as **Small for Gestational Age (SGA)** also known as dismature. That means that their weight fell below the 10$^{th}$ percentile for their age on the weight chart of Lubchenco (Mullen et al., 1988). 89-90% of the infants in Group 2 & 4 (35 and 37 weeks) and 60% of Group 1 (34 weeks) were SGA (Table 5.1). The percentages of SGA and AGA infants are illustrated in Figure 5.4.

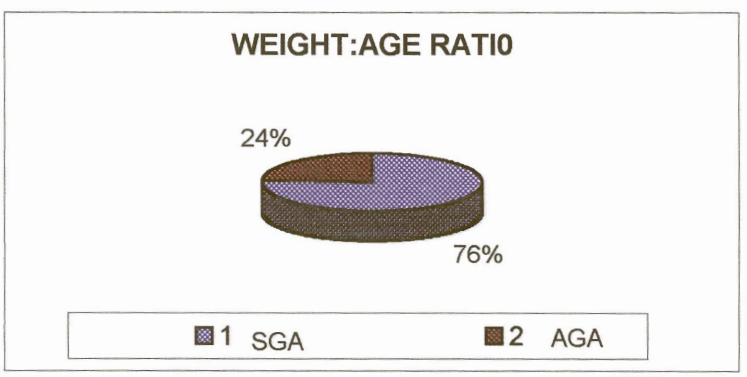


**Figure 5.4 The ratio between SGA (Small for Gestational Age) and AGA (Appropriate for Gestational Age) infants of the total group of subjects**

Of the total group of subjects, an average of 76.3% were SGA. A high percentage of neonates born in the local maternity hospital could be classified as dismature or SGA infants. Unpublished research which was conducted in a neighbouring hospital, found an indication that black infants scored higher on the Ballard Scores than white infants (De Witt, 1999). This has the implication that, because they are actually younger than the Ballard Score indicates, their low weight may be more appropriate for the lower gestational age. That could explain the difference between SGA and AGA.

### . 3 *Current Weight* (at the time of the evaluation)

In the two younger age groups, Groups 1 & 2 (34 & 35 weeks), about 60% of the subjects weighed below 1.5 kg. In Group 3 (36 weeks), 55% weighed 1.5-1.8 kg and 27% over 1.8 kg. Group 4 (37 weeks) had a more or less even distribution between the weight ranges, with 30% weighing over 1.8 kg (Table 5.1). The current-weight distribution between the weight ranges of the whole group is illustrated in Figure 5.5.

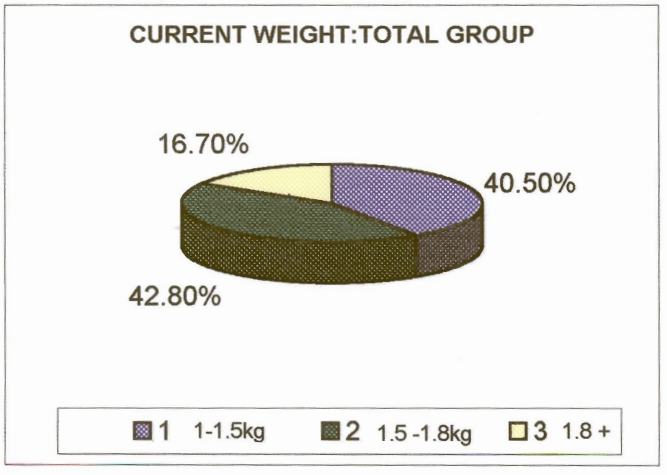


**Figure 5.5 Distribution of the current weight for the total group of subjects.**

At the time of the assessment, only 16.7% of the subjects would have been considered suitable for oral feeding by the staff in the NICU (using a weight criterion) and 83.3% (40.5% + 42.8%) as unsuitable. It is expected that a high percentage of infants would still receive nasogastric tube feeding, with little

opportunity to gain experience in oral feeding, which may influence the results of oral feeding skills. Brake et al. (1988) and Casaer et al. (1982) stated that feeding efficiency improves with experience, although Bazyk (1990) stated that neuro-maturity played a more significant role than oral motor experience. The result obtained in this study will give an indication of which criterion (weight or maturity) may be the better choice, in deciding when to introduce oral feeding in premature infants.

### . 4 Gender and Race

Slightly more females (54%) than males (46%) participated in the study, illustrated in Figure 5.6. The majority of subjects were black (73.8%) as opposed to 21.4% of white subjects as illustrated in Figure 5.7. A very small percentage (4.8%) of coloured subjects participated in the study and will not be considered as a separate race group.

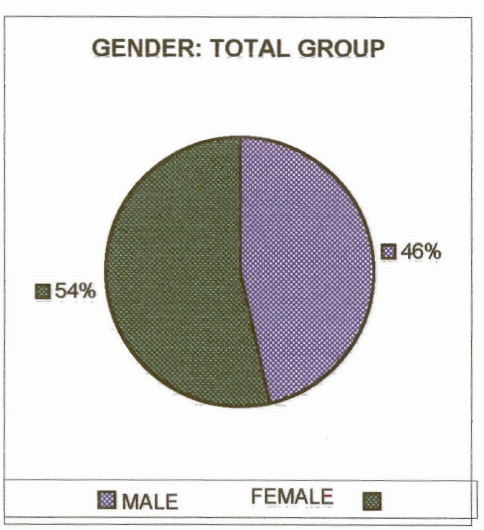


**Figure 5.6 Distribution of gender: Total group**

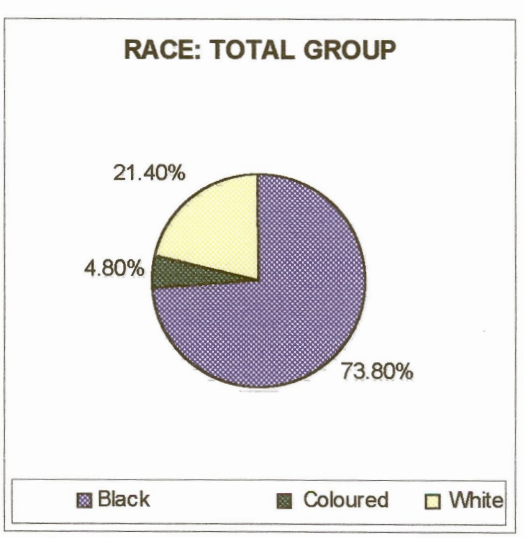


**Figure 5.7 Distribution of race: Total group**

The literature does not discriminate between the oral feeding skills of different genders or race groups. However, in view of the indication in the unpublished study mentioned above regarding SGA and the fact that the majority of subjects

were black, race has to be taken into consideration in the interpretation of oral feeding skills and/or developmental trends dealt with later in this chapter.

In **conclusion:** the subjects as a whole can be described as moderately premature, born with very low birth weights (VLBW) (the majority had a birth weight of 1-1.49 kg) and three quarters of the cases can also be considered as small for gestational age (SGA). According to a neuro-maturation criterion for readiness to feed orally, 47.6% of the subjects would have been ready *at birth* already, in contrast to the 4.8% by a weight criterion. *At the time of the evaluation*, 60% of the two younger groups (1 & 2) still had a weight below 1.5 kg. Only 16% of the whole group weighed over 1.8 kg and would have been considered ready for oral feeding by a weight criterion, in contrast to 100% using a neuro-maturation criterion as suggested by the literature (Creger, 1995; Vergara, 1993). The distribution between the genders was approximately equal. The subjects consisted of White, Black and Coloured infants, with the majority being Black.

### 5.2.1.2 Medical History

The information was obtained from the subjects' medical files and notated under heading 1, namely Medical History, on the FEFARI (Appendix A).

A summary of the results is illustrated in Table 5.2. Although ten further factors in addition to those indicated here, are included in the FEFARI, most of them are associated with neurological insults. Infants with possible neurological problems due to e.g. IVH, were excluded from this study, as explained in Chapter 4.

**Table 5.2 Number of subjects displaying the most recorded Risk Factors**

| | Group 1 N=10 | Group 2 N=11 | Group 3 N=11 | Group 4 N=10 | TOTAL N=42 | Percentage Total group |
|---|---|---|---|---|---|---|
| Prematurity | 10 | 11 | 11 | 10 | 42 | 100% |
| BPD | 5 | 4 | 4 | 4 | 17 | 40.50% |
| Ventilation | 3 | 3 | 2 | 3 | 11 | 26.20% |
| Pneumonia | 2 | 1 | 1 | 0 | 4 | 9.50% |
| Cardiovascular | 1 | 2 | 3 | 1 | 7 | 16.70% |
| Apgar under 7 | 3 | 0 | 0 | 1 | 4 | 10.80% |
| Tube feeding | 9 | 8 | 10 | 6 | 33 | 80.50% |
| TORCH infection | 1 | 3 | 0 | 1 | 5 | 11.90% |

As suspected from the biographical information, 80.5% of the subjects received tube feedings (Table 5.2), as opposed to only 52.4% (40.5% + 11.9%) who were, according to their neuro-maturity, not ready to receive oral feedings (Figure 5.2) and should therefore have received nasogastric feedings. This percentage (80.5%) correlates with the 83.3% (40.5% + 42.8%) of infants who weighed under 1,8 kg at the time of the evaluation (Figure 5.5). This confirms the fact that weight at present plays a more important role than maturity in determining the method of feeding used in premature infants in the local NICU. The number of subjects who received tube feeding in the different subject groups was: 9 out of 10 in Group 1 (34 weeks); 8 out of 11 in Group 2 (35 weeks); 10 of the 11 in Group 3 (36 weeks); and 6 out of 10 in Group 4 (37 weeks). Although Group 4 had fewer subjects still on nasogastric feeding than the younger groups, these 6 were fewer than expected from a maturational point of view, although still more than expected if weight is considered, as only 3 of these infants weighed over 1.8 kg. It should always be kept in mind that long-term nasogastric feeding may cause considerable complications (see 2.4.4) and was found to be the best predictor for communication delays by Kritzinger (1994).

The risk factor that occurred the second most was BPD (40.5%) and had more or less an even distribution amongst the age groups. This correlates with the incidence of 5-45% of premature infants who have BPD mentioned by Vohr

(1991). Difficulties in sustaining oral feeding can be expected from nearly half of the subjects, due to feeding difficulties of infants suffering from BPD (see 2.3.1.3).

Third highest was ventilation with 26.2%, which was also evenly distributed between the age groups. Long-term ventilation can have serious effects on feeding skills, as discussed in Chapter 2 (see 2.4.3). That is why infants who needed ventilation for longer than 2 days were excluded from this study. It is thus not expected to influence the results in this study.

Cardiovascular problems occurred in 16.7% of all subjects, with the most of these subjects from Group 3 (36 weeks), namely 3 out of 11 (27%). This could influence endurance with oral feeding because of the extra energy expenditure needed for oral feeding (Sheahan & Brockway, 1994) and may explain why such a high percentage of them received tube feeding. This fact should be kept in mind when interpreting the results of the 36-weeks group.

TORCH infections were recorded in 11.0% of the subjects, with most of the infants in Group 2 (35 weeks). The infection in all three cases was congenital sepsis and is not expected to have a great influence on the results, as the infants had to be relatively normal and healthy at the time of the evaluation to have been selected for the study. The 1-min Apgar score of less than 7 occurred in 3 of the 10 subjects in Group 1 (34 weeks). The 5-min Apgar score was over 7, so no neurological sequelae are expected to influence the feeding skills. Rossetti (1998) only regards a low Apgar score as indicative of risk *if the second score is lower than the first.* It was furthermore one of the criteria for selection of the subjects as well.

Pneumonia (congenital) occurred in 9.5% of the subjects with the most of these subjects in Group 1 (34 weeks). Pneumonia can have a negative influence on oral feeding as well (see par. 2.4.3). The infants had recovered from the pneumonia at the time of the evaluation and it should not influence the results, but may explain

why most of them (9 out of 10) received tube feeding, apart from their low birth weights. Since most of them were born at 31-33 weeks, long-term effects of tube feeding might not have been well established yet.

In conclusion, it can be stated that long-term nasogastric feeding is the risk factor with the highest incidence in the subjects. BPD and Ventilation occurred second and third most often. The other factors which were displayed, may have contributed in part to the reason why the subjects still received tube feedings. These factors represent high risk factors for feeding problems.

### 5.2.1.3 Current State and Behaviour

Information was obtained from the bed charts of the infants and entered on page 2 of the FEFARI (Appendix A) under heading 2, namely Current State/Behaviour.

A summary of the factors related to current state and behaviour is presented in Table 5.3.

**Table 5.3 Subjects' scoring on items in the STATE AND BEHAVIOUR section of the FEFARI**

| | Group 1 N=10 | Group 2 N-11 | Group 3 N=11 | Group 4 N=10 | TOTAL N=42 | Percentage TOTAL GROUP |
|---|---|---|---|---|---|---|
| Not Alert | 9 | 10 | 8 | 9 | 36 | 85.70% |
| Lethargic | 9 | 9 | 8 | 9 | 35 | 83.30% |
| Medication | 4 | 3 | 2 | 2 | 11 | 28.20% |
| Apnea | 1 | 3 | 0 | 1 | 5 | 11.90% |

Most of the subjects were healthy and did not display problems in this section, except that they were lethargic.

Considering the total group of subjects, about 85% of them were not alert, but lethargic at the time of the assessment (Table 5.3). This correlates with the

statement of Creger (1995) that the premature infant has difficulty in maintaining an alert state.

Sucking skills are better when an infant is alert. Mandich & Ritchie (1996) state alertness as a prerequisite for oral feeding. Considerable influence on feeding skills can thus be expected. The assessment was done during the scheduled feeding time of the NICU. The questions can be raised of whether the subjects would have been more alert at a different time as the scheduled feeding time if the subjects' individual sleep-awake cycles were respected and of how facilitative scheduled feeding times are for oral feeding. In a study conducted by Cagan (1995), it was found that 70% of the premature infants suggested that they were ready to feed at a time other than the scheduled feeding time and if they were fed at a time at which they demonstrated feeding readiness behaviour, 18.7% less nasogastric tube feeding was used.

The type of medication that 28,2% of the subjects received is not considered to have any influence on the oral feeding skills (De Witt, 1999). Apnoea did not occur in great numbers, except in Group 2 (35 weeks) (3 out of 11). According to the literature feeding apnoea occurs more often than sleep apnoea (Dreier et al., 1979; Garg et al., 1988; Rosen et al., 1984). Special consideration to this fact should be given, in interpreting results of Group 2 especially, who displayed the highest incidence of sleep apnea.

| |
|---|
| The conclusion can be drawn that maintenance of an alert state was, at the time of the evaluation, one of the biggest problems for the subjects. It is speculated that this will influence the oral feeding skills of the majority of the subjects |

### 5.2.1.4 Physical Examination

Information gathered from the physical examination performed by the researcher was notated on page 2 under heading 3. Physical Examination on the FEFARI (Appendix A)

The results are summarized in Table 5.4.

**Table 5.4 Subjects displaying unfavourable characteristics for oral feeding in the PHYSICAL EXAMINATION section of the FEFARI.**

| | Group 1 N=10 | Group 2 N=11 | Group 3 N=11 | Group 4 N=10 | TOTAL N=42 | Percentage TOTAL GROUP |
|---|---|---|---|---|---|---|
| Asymmetrical | 0 | 0 | 1 | 2 | 3 | 7.10% |
| Abnormal tone | 2 | 5 | 1 | 4 | 13 | 31% |
| Floppy | 1 | 3 | 2 | 2 | 8 | 19% |
| Hypertonic | 0 | 1 | 0 | 1 | 2 | 4.80% |
| Tone: feeding | 1 | 1 | 1 | 3 | 6 | 14.30% |

Most of the infants displayed a symmetrical body alignment and abnormal tone was observed in approximately a third of the subjects.

Nearly half of the subjects in Groups 2 and 4 (35 and 37 weeks) displayed abnormal tone. An average of 31% of the total group of subjects displayed abnormal tone. In both these groups (35 & 37 weeks) approximately half of the abnormal tone could be considered as very floppy and a quarter to be distinctly hypertonic. Sheahan & Brockway (1994) and Witt & Rusk (1993) state that the younger the infant, the more floppy he/she would be. This study did not find that, on the contrary, the age group who least displayed floppiness was the youngest group. The only other factor that both Groups 2 & 4 with more floppy infants have in common is that they both have the highest incidence of SGA infants (table 5.1). There might be a relation between SGA and hypotonicity. It is known from the literature that the SGA infants tend to be in an overall weak state (Vohr, 1991) and they may therefore appear to be more floppy. For the group as a whole 19%

were considered very floppy and 4.8% to be hypertonic. Group 4 (37 weeks) seemed to have the biggest problem with tone whilst feeding, which is contrary to what is expected, as it is believed that tone improves with maturity (Sheahan & Brockway, 1994; Witt & Rusk, 1993). Group 4 is suppose to be the most mature group. Abnormal tone has a negative influence in oral feeding (Morris & Klein, 1987; Morris, 1989)

In conclusion it can be stated that although abnormal tone was displayed in approximately half the subjects in two of the groups, problems with tone generally and during feeding did not have a high occurrence across the group as a whole and therefore the influence on oral feeding skills of the subjects is not expected to be widespread.

### 5.2.1.5 Oral Feeding History

Information was obtained from the subjects' bed charts and recorded on page 3 under heading 4: Oral Feeding History on the FEFARI (Appendix A).

The subjects received feeding at a scheduled interval of 3 hours and the method of feeding varied. The duration of the feed, (presented in table 5.5), positioning during feeding and endurance depended on the method of feeding applied

**Table 5.5 Subjects managing amount of their feed**

| | Group 1 N=10 | Group 2 N=11 | Group 3 N=11 | Group 4 N=10 | TOTAL N=42 | Percentage Total group |
|---|---|---|---|---|---|---|
| Endurance | | | | | | |
| Whole feed | 1 | 1 | 4 | 2 | 8 | 19.50% |
| More than ½ | 0 | 1 | 1 | 2 | 4 | 9.80% |
| Less than ½ | 9 | 9 | 6 | 5 | 29 | 70.70% |

90% of the subjects in the two younger Groups 1 & 2 (34 & 35 weeks) could not finish at least half of their feed orally, but of the 36 weeks group only

approximately 50% of the subjects could **not** finish at least ½ of their feed orally. Although this group (Group 3) had the most subjects (4 out of 11) who could manage their whole feed, it still comprised only ± 36% of the subjects in this group. For the total group, only 19.5% could manage their whole feed orally, which corresponds with the 16.7% who were over 1.8 kg. Only 9.8% of the total group could manage more than half of the feed and 70.7% less than half. Possible explanations for such weak performances can be that the subjects were not exposed to oral feeding experience (Brake et al., 1988; Casaer, 1982), because they were considered unsuitable for oral feeding due to their low birth and current weights. It is possible that, due to staff shortages, nasogastric feeding may have been favoured rather than the time consuming task of introducing oral feeding. On the other hand, they could still be weak and actually have low endurance due to the fact that such a great percentage (76.2%) of them are dismature (table 5.1). Aversive behaviour due to long-term nasogastric feedings and other noxious procedures that these premature infants were exposed to, may have played a significant roll in the subjects' weak performances as well (Bazyk, 1990; Vergara, 1993).

The feeding methods used for the different subject groups, are illustrated in Figure 5.8 and for the group as a whole in Figure 5.9.

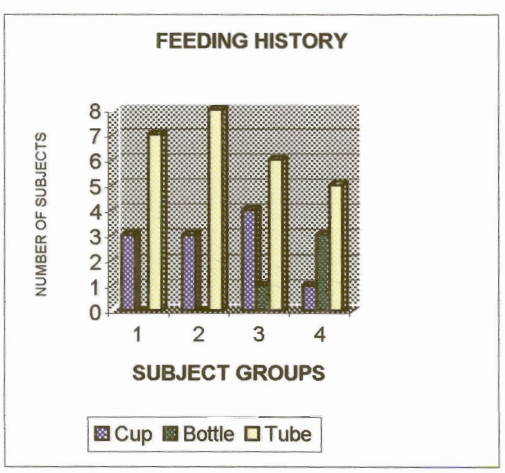


Figure 5.8 Feeding Method for each Age group

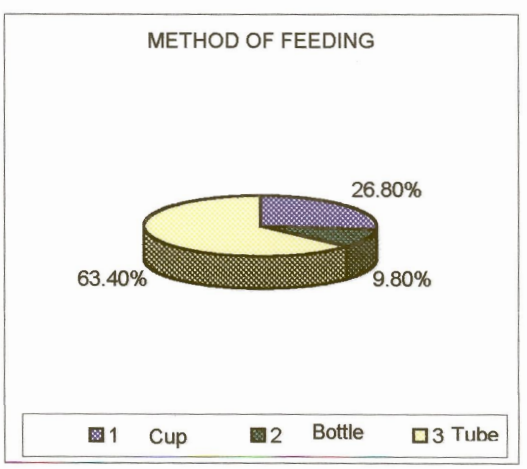


Figure 5.9 Feeding Method for the Total group

From the above, it is clear that approximately 70 % of the subjects of the two younger groups 1 & 2 (34 & 35 weeks) received mainly tube feeding (Figure 5.8). Only one subject in Group 2 weighed over 1.8 kg and ± 40% over 1.5 kg at the time of the evaluation (Table 5.1). Once again, as was seen in 5.2.1.1, there is a better correlation between tube feeding and weight than gestational age. The rest of the subjects in these two groups received cup feeding, which demonstrates the commitment of the local hospital to meet with the criteria for a "Baby Friendly Hospital". An interesting observation was made in the 37 weeks group, namely, 3 of the 4 subjects who received oral feeding, received bottle instead of cup feeding. An explanation may be that the mothers indicated that breastfeeding was not an option any more, which may be indicative of the problems mothers experience with the slow transfer from tube to oral feeding and the effects thereof on breastfeeding (see 2.3.1.1) (Morris, 1989; Meier & Pugh, 1985; Mandich & Ritchie, 1996).

At the time of the assessment 63.4% of the total group of infants still received nasogastric tube feeding as illustrated in Figure 5.9, although the whole group was mature enough to receive oral feeding according to a maturation criterion.

| |
|---|
| In conclusion, it can be stated that the subjects had a feeding history of weak oral feeding performances, necessitating nasogastric feeding. |

### 5.2.1.6 Mother-Infant Interaction

This section was included on page 3 in the FEFARI, but due to the great number of mothers who could not be present at the evaluation, results of this section could not be included in this study. Absence of mothers in the NICU is a problem in the local hospital due to many transport problems the parents experience. Kritzinger (1994) found a significant correlation between the number of visits of mothers to their infants in the NICU and communication development of the

infants, as well as transfer to oral feeding. This fact should alert team members involved in the follow up of the infants of this hospital to pay specific attention to communication development.

### 5.2.1.7 Oral Structures At Rest

Information was gathered by observing the subjects and notating the results on page 4, under heading 6: Evaluation of the Feeding Procedure, of the FEFARI (Appendix A). This subsection was divided into two parts of which "Oral Structure at Rest" was the first part. A summary of the results in this section is presented in Table 5.6.

**Table 5.6 Subjects with "abnormal" scores in items of the Oral Structures at Rest subsection of the FEFARI**

| | Group 1 N=10 | Group 2 N=11 | Group 3 N=11 | Group 4 N=10 | TOTAL N=42 | Percentage Of total group |
|---|---|---|---|---|---|---|
| LIPS: Open | 5 | 2 | 1 | 1 | 9 | 21.40% |
| " Rooting reflex | 7 | 6 | 8 | 7 | 28 | 66.70% |
| Sucking pads | 5 | 2 | 6 | 4 | 17 | 40.50% |
| Gag reflex | 7 | 6 | 8 | 8 | 29 | 72.50% |
| Biting reflex | 4 | 3 | 2 | 4 | 11 | 28.20% |
| High arch | 2 | 4 | 2 | 3 | 11 | 26.20% |
| Tongue retracted | 2 | 4 | 2 | 3 | 11 | 26.20% |

The oral structures under observation were the lips, cheeks, jaw, hard- and soft palates and tongue. No problems were generally found with symmetry or tone in these structures, but the oral reflexes seemed to be diminished.

The rooting and gag reflexes appeared to be affected the most in the group as a whole. Not much change with maturation of these reflexes from 34 to 37 weeks (Group 1-4) was observed, on the contrary, the gag reflex score was the lowest in the 36 and 37 weeks groups (Groups 3 & 4). According to the literature, the gag reflex should evolve around 34 weeks (Arvedson & Lefton-Grief, 1996; Logan & Bosma, 1969), but in this study, the subjects with a gestational age of 37 weeks,

still had hypoactive gag reflexes. Approximately 80% of them displayed a hyposensitive gag reflex.

Possible explanations of this fact is that it may partly be due to the fact that the gag reflex is not developed well enough, or that the reflex could have become desensitised due to noxious procedures they have been exposed to over a long period in the NICU. The literature states that the gag reflex is a prerequisite for safe oral feeding (Merenstein & Gardener, 1989, Sheahan & Brockway, 1994), but Arvedson & Lefton-Grief (1996) is of the opinion that no relationship between the presence/absence of the gag reflex and swallowing abilities exists. It can be argued that since oral feeding is supposed to be a neuro-maturation phenomenon and these infants are old enough to feed orally, the gag reflex may not be a prerequisite for oral feeding, thus supporting the opinion of Arvedson & Lefton-Grief (1996). On the other hand, only half of these infants could manage more than half of their oral feeds. Questions can subsequently be raised about the safety of oral feeding in these infants.

The absence or inconsistent rooting reflexes may also be due to desensitisation of the reflex after repetitive noxious procedures, e.g. taping of nasogastric tubes, to which these infants are exposed to in the NICU. The diminished rooting reflexes recorded in this study correlate with the findings of depressed rooting reflexes in the neonates who participated in the study conducted by Kritzinger (1994). It is expected to influence the lip functioning during oral feeding.

The absence of sucking pads in 40.5% of all the subjects did not demonstrate any maturational changes from 34 to the 37 weeks gestational age (Groups 1-4). This may be due to the little body fat that these infants still have, because the majority are still SGA and 83.3% still weighed less than 1.8 kg at the time of the evaluation (Table 5.1). The characteristic of the lips that remain open in the resting position showed a dramatic improvement from Group 1 to 4 (34 weeks to 37 weeks) (Table 5.5) and was mainly observed in Group 1 (34 weeks gestational age).

Morris & Klein (1987) mention this behaviour as characteristic of premature infants. This study found it to be more representative of the moderate and extremely premature infants. In 26.2% of all of the subjects, a high arch and retracted tongue were recorded, with no dramatic differences between the age groups.

In conclusion, it can be stated that although structurally, the main problem may be the absence of sucking pads, diminished oral reflexes seem to occur often in the subjects. The diminished reflexes may have a more serious effect on oral feeding skills of the premature infant than the absence of the sucking pads.

### 5.2.1.8 Summary Of Characteristics

In summary, the subject groups demonstrated the following characteristics:

- **Group 1** (34 weeks gestational age)

This group has the second lowest average current weight (1.45 kg). All but 1 received tube feeding from birth and at the time of the assessment, 70 % were still being tubefed. The rest all received cup feeding. Of all the groups, they had the most subjects with low Apgar scores and the most subjects with BPD, a history of pneumonia, open lips when at rest and diminished rooting and gag reflexes. It is suspected that they will have the most oral feeding problems.

- **Group 2** (35 weeks gestational age)

They had the lowest average birth weight (1.22 kg), current weight (1.44 kg) and Ballard scores. The second most SGA infants were in this group. They also had the most number of congenital infections, apnea and abnormal tone. Of the 72% who received tube feeding from birth, 70% still received tube feeding at the time

of the assessment. The highest incidence of high arched palate and a retracted tongue were displayed in this group (40% each). According to the number of the risk factors for oral feeding in this group, considerable feeding problems are expected in this group as well.

- **Group 3** (36 weeks gestational age)

All but 1 subject received tube feeding from birth, but at the time of the study, only 54% were still mainly on tube feeding. Of the remaining group who received oral feeding, 36% could manage their whole oral feed. This group had the most subjects (28%) with a history of cardiovascular problems, a diminished rooting reflex (80%), a lack of sucking pads (60%) and 72% demonstrated a hypoactive gag reflex (2$^{nd}$ most). The relatively low number of subjects who received mainly tube feedings at the time of the evaluation, implies that less oral feeding problems can be expected in this group.

- **Group 4** (37 weeks gestational age)

This group had the most SGA infants (90%) and the second most with abnormal body tone (40%). It may be argued that the high incidence of SGA infants in this group may be due to the fact that all the AGA infants in this age group would already have been discharged from the hospital because they had an acceptable weight, contrary to the SGA infants who would still have a low weight. This group may therefore not be representative of 37-week gestational age infants. Three of the four subjects on oral feeding received bottle-feeding, but only 20% could manage the whole feed. The highest incidence of a hypoactive gag reflex was demonstrated in this group (80%). The high percentage of SGA subjects suggests that oral feeding may still be problematic in this group.

These characteristics should be kept in mind when interpreting the results discussed further on.